Nov. 14, 1939. P. PFEIFFER 2,180,254

DEVICE FOR GOVERNING THE FUEL PUMP OF A DIESEL RAM

Filed Dec. 31, 1937

Fig. 1

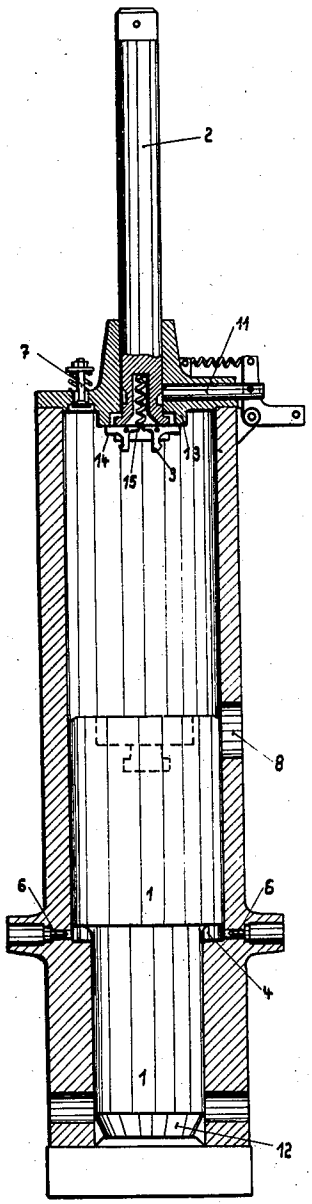
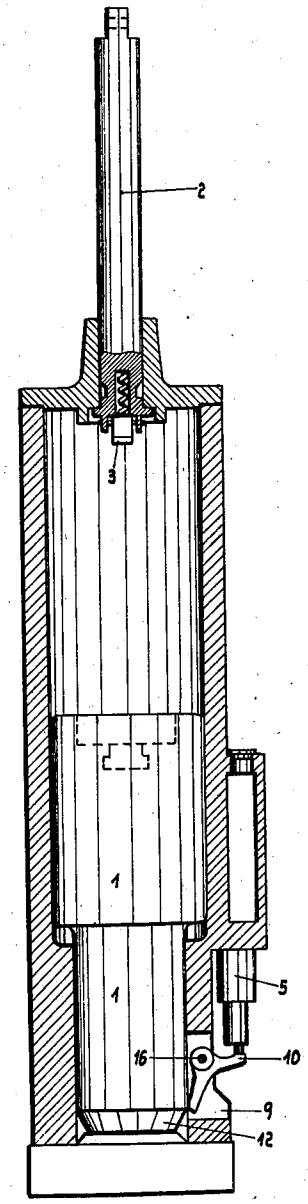



Fig. 2




Inventor
Paul Pfeiffer,
By Frank S. Appleman
Attorney

Patented Nov. 14, 1939

2,180,254

# UNITED STATES PATENT OFFICE

2,180,254

## DEVICE FOR GOVERNING THE FUEL PUMP OF A DIESEL RAM

Paul Pfeiffer, Hamburg-Altona, Germany

Application December 31, 1937, Serial No. 182,887
In Germany March 19, 1935

2 Claims. (Cl. 123—7)

Devices for governing fuel pumps of Diesel operated pile drivers with a stationary cylinder and a freely movable piston acting as a ram are well known. Among such devices, it was proposed to merely operate the pump by having it dropped upon a pile, which method failed, however, in causing proper injection of fuel. Also, it has been proposed in connection with internal explosion power ramming devices, particularly rams for driving piles, to regulate the admission of the fuel, to have a cam fastened to the drop hammer act upon a rotary lever of the fuel pump. In this instance, however, the dropping element would have to be guided. In case one is desirous to apply this latter feature to the first mentioned type of pile drivers having a stationary cylinder and freely movable ram, another difficulty would be caused by the fact that such a cam could not be successfully employed.

This problem is solved by the invention in such a way that at the lower end of the piston a taper-shaped turned face known in itself for governing valves is arranged by which the fuel pump is operated by means of a lever rotatably arranged in the wall of the cylinder when the piston is dropping down. This means that the turned surface at the lower end of the piston acts as a governing curve having the purpose of permitting the exact regulation of the beginning and of the course of fuel feed according to the said curve. This embodiment of the invention offers the advantage that the dropping part must not be guided but can rotate like a ram, so that also for this type of pile drivers the problem of regulating the fuel feed has been solved in the most satisfactory manner.

One embodiment of the present invention is shown by way of example in the attached drawing, it being understood, however, that the invention is not limited to the one feature shown.

Figs. 1 and 2 show two longitudinal sections displaced by 90° one to another taken through the device.

1 is the ram forming a stepped piston being lifted by the tie-rods 2 by means of automatically engaging and releasing claws 3. At the top the claws meet the cylinder cover at 13 and are then pressed by stops 14 into the position shown in Fig. 1, so that the ram 1 is freely lifted and released by the said claws. Between the claws a tie-spring 15 is arranged separating parts 3.

By the falling ram 1 the air inside the annular space 4 is compressed to such a degree that the driving means, f. i. oil, injected by fuel pump 5 and finely dispersed by nozzles is ignited and the mixture is caused to explode. An air suction valve 7 is arranged, so that the ram may freely drop. After the ram has been raised by the explosion, the waste gases may escape through slots 8, while fresh scavenging air may enter from below at 9. The device is arranged in such a way that the ram is always raised to such an extent that the piston part of smaller diameter gets out of its cylinder space thus providing connection of slot 9 with the annular space 4, so that fresh air is admitted to the said space. On account of the hammer being raised by explosion, the air in the space above the piston is compressed. The said compressed air is giving the ram a faster downward speed resulting in an increased frequency of impacts compared with those of freely dropping hammers.

The fuel pump 5 is actuated by means of lever 10 being arranged to rotate about point 16, the said lever being actuated in its turn by governing curve 12 provided at the lower end of ram 1. The said governing curve being carried around the whole ram, the latter ought not to be guided but is permitted to freely rotate inside the cylinder.

The tie-rod 2 serving for starting the device is sealed at the cylinder cover and can be held in position by a lock 11 with oblique lip. The said lock, being preferably pressed under spring action against the tie-rod, brings about a certain sealing effect being necessary for preventing air from escaping.

What I claim is:

1. In an internal combustion ram, a ram cylinder, a fuel pump having a cylinder fixed on the exterior of the ram cylinder intermediate its ends, said fuel pump having a reciprocable actuating member projecting from its lower end, said ram cylinder having an opening adjacent its lower end, a lever pivoted intermediate its ends in said opening and having one end engaging against the lower end of said actuating member, the lever having its other arm movable into and out of the space within the ram cylinder, and a piston reciprocable in said cylinder and freely rotatable therein, said piston acting upon its descent to cam the lever by engagement with the second mentioned arm thereof and thereby actuating the pump.

2. In an internal combustion ram, a ram cylinder, a fuel pump having a cylinder fixed on the exterior of the ram cylinder intermediate its ends, said fuel pump having a reciprocable actuating member projecting from its lower end, said ram cylinder having an opening adjacent

its lower end, a bell crank lever pivoted intermediate its ends in said opening, said lever being mounted on a shaft having its ends seated in the opening walls and having one end engaging against the lower end of said actuating member, the lever having its other arm movable into and out of the space within the ram cylinder, and a piston reciprocable in said cylinder and freely rotatable therein, said piston having an inverted frusto-conical lower end acting upon descent of the piston to cam the lever by engagement with the second mentioned arm thereof and thereby actuating the pump.

PAUL PFEIFFER.